2 sample t wksht

#2 & 4

② $(\bar{X}_S - \bar{X}_I) \pm t^* \sqrt{\dfrac{S_S^2}{n_S} + \dfrac{S_I^2}{n_I}}$

ud

$= (2.4386, 3.3214)$

$\boxed{df = 68.8650}$

We are 90% conf. that the difference between the avg. cost of groceries in suburban & inner city stores is btw \$2.44 and \$3.32.

State
1) 2 indep. SRS
2) 2 normal pop
or
n_1 & $n_2 \geq 30$

check
1) assumed
2) $n_1 = 45$
$n_2 = 35$ } ≥ 30

④ STATE

① 2 indep. SRS

② 2 normal pop.

or

and $n_1, n_2 \geq 30$

CHECK

① circled

② $n_1 = 40$, $n_2 = 50$ ≥ 30 ✓

$H_0: \mu_I = \mu_B$

$H_a: \mu_I \neq \mu_B$

$$t = \frac{\bar{x}_I - \bar{x}_B}{\sqrt{\frac{s_I^2}{n_I} + \frac{s_B^2}{n_B}}} = 2.6040$$

$2 \cdot P(t > 2.6040 \mid df = 86.6260) = 0.0108$

We reject Ho b/c p-value of 0.0108 < α = 0.05. We have sufficient evidence that the avg. business lunch cost of insurance companies is not equal to that of banking companies.

Pooled 2 sample t

putting together 2 things for one purpose

Notes

- 2 samples taken from 2 diff. populations (estimate μ_1 and μ_2)

* Both populations have same σ

$\sigma_1 = \sigma_2$

$s_1 \quad s_2$

Ex: Hts of 18 yr old M + W

estimate σ

- use both s_1 and s_2
- combine s_1 and s_2 into one s that estimates σ

- Give more weight to the std. dev. w/ bigger sample size

- $$S_p = \sqrt{\frac{(n_1-1)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}}$$

pooled std. dev.

df

$n_1 = 40$

$\rightarrow n_2 = 50$

S_1 S_2

S_p

S_p also called pooled estimator of σ

2 sample t -pooled $\sigma_1 = \sigma_2$

Hyp - same

Test stat - $t = \dfrac{\bar{X}_1 - \bar{X}_2}{S_p\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$

P-val - same

Concl - same

Conf Int

$$(\bar{X}_1 - \bar{X}_2) \pm t^* s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = (a, b)$$

conclusion - same

$df = n_1 + n_2 - 2$ (on calc)

Calc: Pooled: $\boxed{\text{YES}}$

Check

Assumptions

① 2 indep SRS

② 2 norm. pop.

or

$n_1, n_2 \geq 30$

③ $\sigma_1 = \sigma_2$

$s_1 = 2.34$ ~~1.2~~

$s_2 = 2.35$ ~~1.9~~

③ Stated /

$s_1 \approx s_2$

Ex: State

① 2 indep SRS

② 2 normal pop.

or

$n_1, n_2 \geq 30$

③ $\sigma_1 = \sigma_2$

CHECK

① stated/circled

② assumed

③ $s_1 \approx s_2$

$H_0: \mu_A = \mu_B$

$H_a: \mu_A > \mu_B$

$$t = \frac{\bar{x}_A - \bar{x}_B}{s_p\sqrt{\frac{1}{n_A} + \frac{1}{n_B}}} = 0.423$$

$P(t > 0.423 \mid df = 34) = 0.337$

- We fail to reject ....

-

p. 562
#65

σ^2

Variances

Unequal

Equal

$\sigma_1^2 = \sigma_2^2$
Pooled